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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/774,346

02/06/2004

Densen Cao

5125 P

5248

7590

04/03/2006

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EXAMINER

MAY, ROBERT J

ART UNIT

PAPER NUMBER

2875

DATE MAILED: 04/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/774,346

Applicant(s)

CAO ET AL.

Examiner

Robert May

Art Unit

2875

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 06 February 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) 23-25 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-22 is/are rejected.
- 7) ☒ Claim(s) 23 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 February 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Response to Arguments***

Applicant's arguments with respect to the amended Claims have been considered but are moot in view of the new ground(s) of rejection.

### ***Drawings***

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the secondary heat sink must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner,

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the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Claim Objections***

Claim 23 has apparently been omitted. The office will not further treat Claim 23 on the merits.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-3, 6, 8-9, 12-13, 15-16, 18-19, & 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hanley (US Pat 6,733,150) in view of Hochestein, Hartley and Koehler (cited in the previous office action).

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Regarding Claims 1,12,16, & 22 Hanley discloses in Figure 13, Head gear with forward illumination using semiconductor chips 1330 and a remote power source 1350 that is of a non-sparking nature so that the apparatus can be worn by a firefighter when entering flammable combustible environments (Col 10, Lines 38-42).

Regarding Claim 1,12,16, & 22 Hanley fails to disclose a semiconductor chip mounted to heat sink comprising a primary, secondary, and dissipating heat sink with the secondary heat sink having an internal volume greater than the primary heat sink.

Regarding Claims 1,12,16, & 22 Hochstein discloses in Figure 2, an LED 12 affixed to a primary heat sink 18 which is attached to a secondary heat sink 32 which is attached to a heat dissipating heat sink configured as fins 32 in order to maintain the light output of the LED package when the LED apparatus is used in critical situations where the reduction in luminous output can have dire consequences (Col 1, Lines 38-43) such as within a flammable mine environment. Therefore, it would be obvious to one of ordinary skill in the art to modify the LEDs of Hanley's front illuminating fireman's helmet with the LED heat sink assembly of Hochstein so that illumination of the LEDs can be maintained in critical safety situations.

Regarding Claims 1 & 12, Hanley fails to disclose a wavelength shifting coating on the chip for converting the monochromatic light emitted to white light.

Regarding Claims 1 & 12, Hartley discloses a flashlight wherein the LED is coated with a phosphor coating which acts to convert the emitted light to a white light (Col 14, Lines 1-3) in order to produce a white light for general illumination purposes.

Therefore, it would be obvious to one of ordinary skill to modify the LEDs of Hanley with a phosphor coating to produce a white light for general illumination purposes.

Regarding Claims 1 & 12, Hanley discloses a remote power source 1350 which is construed as a battery located on a remote location from the light source 1330 on the helmet, but fails to disclose this as a battery pack with a battery sealed within.

Regarding Claims 1 & 12, Koehler discloses in Figures 1 & 6, a waterproof battery and lamp apparatus for underwater divers and miners (Col 1, Lines 6-10) where the battery is sealed within case 15 so as to avoid exposure of the battery to a wet environment. Therefore it would be obvious to one of ordinary skill to modify the remote battery of Hanley with a battery pack sealing the battery within as disclosed by Koehler so as to prevent exposure of the battery to a wet environment.

Regarding Claims 2 & 12, Hanley fails to disclose an airtight magnetic switch for activating the light source.

Regarding Claims 2 & 12, Koehler discloses in Figures 1 and 6, an air and water tight switch mechanism a lighting apparatus for a miner having an electrically conductive ferromagnetic element shiftable in a capsule which shifts in response to the shifting of a magnetic switch (Col 2, Lines 48-52) that protects the circuitry from a wet environment. Therefore it would be obvious to modify the switch of Hanley with magnetic switch of Koehler so that the circuitry is protected from a wet environment.

Regarding Claims 3 & 13, Hanley fails to disclose a device with a second remote battery pack.

Regarding Claims 3 & 13, it would be generally obvious to one of ordinary skill in the art to have a second remote battery pack as a backup power source to the first battery pack and since there is no new and unexpected result attributed to this 2<sup>nd</sup> battery pack, it is considered unpatentable see *In re Harza*, 274 F.2d 669.

Regarding Claims 6 & 15, Hanley fails to disclose a device with a heat sink assembly where there is heat conductive adhesive between the primary and secondary heat sinks.

Regarding Claim 6 & 15, Hochstein discloses a heat sink for an LED with the heat sink assembly as recited in Claims 1 & 12 and the use of a conductive epoxy to bond the primary heat sink 18 to heat sink dissipater 30 as a practical means for thermally coupling heat sinks together (Col 5, Lines 13-16). Therefore, it would be obvious to one of ordinary skill in the art to use thermally conductive adhesive coupling the heat sinks together as a practical means to do so.

Regarding Claims 8 & 18 Hanley fails to disclose the light source 1330 as being either (LED chips, LED Chip arrays, laser diodes, vertical cavity surface emitting lasers, VCSEL arrays, edge emitting lasers, surface emitting lasers and photon recycling devices.

Regarding Claims 8 & 18 Hochstein discloses in Figure 2 an LED chip 12 that is suitable for mounting to a heat sink as disclosed. Therefore, it would be obvious to modify the LED of Hanley with the LED chip of Hochstein so that it can be mounted to a Heat sink surface.

Regarding Claim 9, 19 Hanley fails to disclose heat sinks wherein one of said heat sinks includes material selected from the group consisting of copper, aluminum, silver, magnesium, steel silicon carbide, boron nitride, tungsten, molybdenum, cobalt, chrome, Si, SiO<sub>2</sub>, SiC, AlSi, AlSiC, and diamond.

Regarding Claim 9, 19 Hochstein discloses using a plated copper diamond material for drawing heat away from an LED die (junction) to a heat dissipater to reduce the temperature and extend the life of the LED Package (Col 1, Lines 55-58). Therefore it would be obvious modify the device of Hanley with a heat sink assembly comprising copper plated diamond so that heat may be drawn away from the LED die (junction) to the heat dissipater.

Claims 5, 7, 14, 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hochstein in view of Wallace, Hartley, and Koehler as applied to claims 1 & 12 above, and further in view of Kish (US Pat 5,793,062). Hanley in view of Hochstein Hartley, and Koehler teach and suggest all of the claimed elements of Claim 1 except for a light reflective adhesive between the semiconductor chip and the primary heat sink.

Regarding Claims 5, 7, 14, 17 Kish discloses in Figure 2 a Silver loaded reflective epoxy which affixes an LED to a reflector cup in order to reflect the light from the LED's back surface and improve the intensity of the light (Col 3, Lines 65+). Therefore, it would be obvious to modify the integrated LED heat sink of Hanley in view of Hochstein



and Koehler with the reflective epoxy of Kish in order to improve the intensity of the light emitted.

Claims 10-11 & 20-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hanley in view of Hochstein, Hartley and Koehler as applied to claims 1 & 12 above, and further in view of Singer.

Regarding Claims 10-11 & 20-21 Hanley in view of Hochstein, Hartley and Koehler fail to disclose the chip as including epitaxial layer located on a substrate as claimed in Claim 11 and furthermore this substrate material selected from the group consisting of Si, GaAs, GaN, ZnS, ZnSe, InP, Al<sub>2</sub>O<sub>3</sub>, SiC, GaSb, and InAs as claimed in Claim 10.

Regarding Claims 10-11 & 20-21 Singer discloses a UV Blue LED-Phosphor device using GaN-based epitaxial structures who's advent allowed for the first time the possibility to generate White light from LEDs by applying luminescent phosphor materials on top of the LED Col 1, Lines 20-25). Therefore, it would be obvious to one of ordinary skill in the art to modify the chip of Hanley in view of Hochstein, Hartley and Koehler with the GaN based epitaxial substrate of Singer so that white light may be generated from LEDs.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Gupta (6,955,444) discloses an LED with a heat sink and a remote battery pack

Vriens (5,813,753) discloses an LED chip with a Phosphor coating for allowing the LED to emit white or visible light.

Stopa (6,641,284) disclose an LED Light assembly with a heat sink.

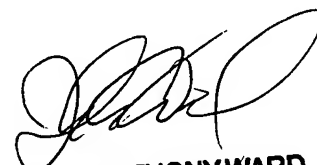
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Robert May whose telephone number is (571) 272-5919. The examiner can normally be reached between 9 am– 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sandra O'Shea can be reached on (571) 272-2378. The fax number for the organization where this application or proceeding is assigned is (571) 273-8300 for all communications.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval PAIR system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

RM

3/28/06



JOHN ANTHONY WARD  
PRIMARY EXAMINER